› 3.4 Turning forces

Exercise 3.4A Identifying turning forces

Focus

In this exercise, you will decide where turning forces are used.

1 Which of these actions needs a turning force to happen?

Tick (✓) **all** that apply.

pushing a door open ☐

pulling a chair across the floor ☐

twisting the top off a bottle ☐

pushing the hands of a clock around ☐

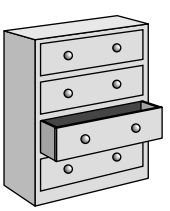
pushing a trolley up a ramp ☐

stretching an elastic band ☐

2 Which of these objects needs a turning force to work?

Tick (✓) **all** that apply.

☐



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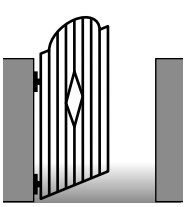

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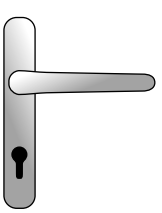

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3 What name is given to the turning effect of a force?

Circle **one** word.

minute **moment** **rotate** **revolve**

Exercise 3.4B Calculating moments

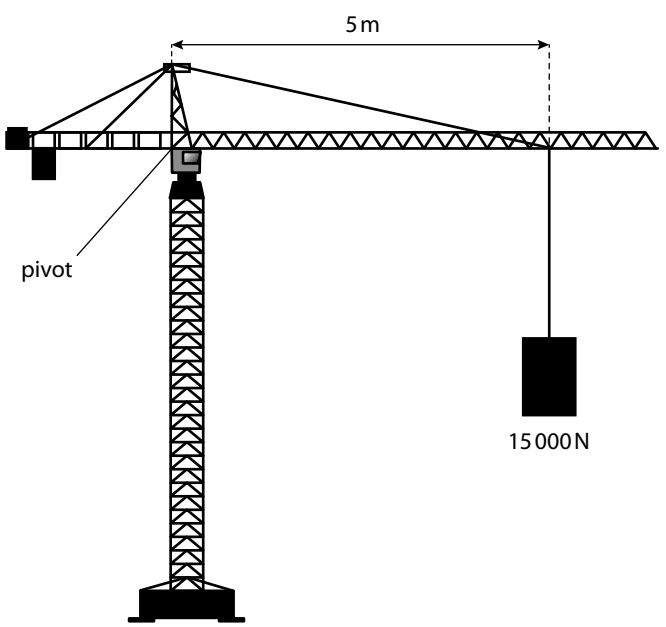
Practice

In this exercise, you will calculate moments and make predictions about moments.

1 Write the equation that links moment, force and distance.

2 The picture shows a crane supporting a 15 000 N weight.

The weight is supported 5 m from the pivot of the crane.



a Calculate the moment caused by the weight on the crane.

Show your working.

.....Nm

b Explain the effect on this moment of:

i moving the weight further from the pivot

.....

.....

ii moving the weight closer to the pivot.

.....

.....

3 Some people use units that are **not** international standard units.

One of these units of distance is the foot.

One of these units of force is pounds.

Write the unit of moment in these units.

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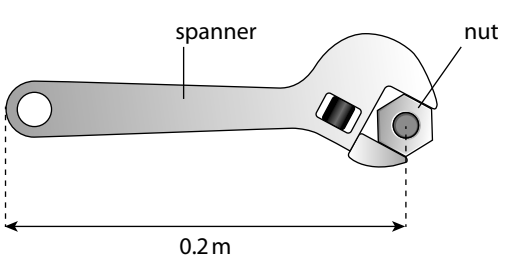
Exercise 3.4C Moments, force and distance

Challenge

In this exercise, you will calculate forces and distances for moments.

1 A spanner will turn a nut. The nut needs a moment of 40 Nm to turn. The spanner is 0.2 m long.



a Calculate the force that must be exerted on the spanner.

Show your working and give the unit.

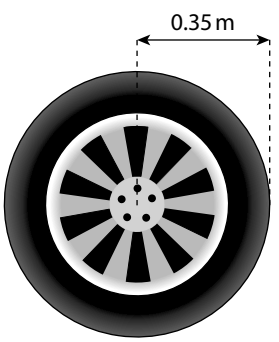
.....

b Explain why using a longer spanner will make the nut easier to turn.

.....

.....

2 An engine exerts a moment of 350 Nm when measured at a wheel.
The engine drives a wheel that has a radius of 0.35 m The pivot of the wheel is at the centre.



Calculate the force at the outside of the wheel.

Show your working and give the unit.

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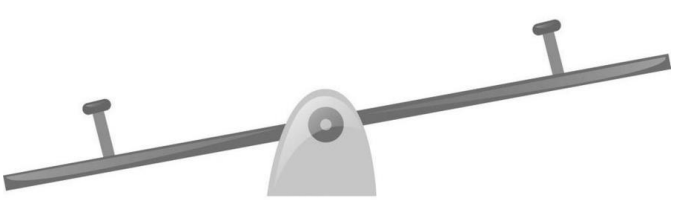
3 Sofia weighs 500 N. She sits on a seesaw at a distance of 2 m from the pivot.



a Calculate the moment that Sofia exerts on the seesaw.
Show your working and give the unit.

.....

The seesaw will balance when the moments on both sides are equal.
Zara weighs 400 N.

b Calculate the distance from the pivot to where Zara should sit to balance the seesaw.
Show your working and give the unit.

.....

3.5 Pressure between solids

Exercise 3.5A Describing pressure

Focus

In this exercise, you will describe what affects pressure in solids.

1 Which of these is used to work out pressure?
Tick (✓) **one** box.

pressure = $\frac{\text{force}}{\text{area}}$ ☐ pressure = mass × area ☐

pressure = $\frac{\text{mass}}{\text{area}}$ ☐ pressure = force × area ☐